B R U E L & K J A E R

TYPE 2112
AUDIO FREQUENCY SPECTROMETER

Service Instructions
Audio Frequency Spectrometer

Consisting of:

Meter Circuit	2112.1	Filter, compl. Adj.	2112.7
Output Amplifier	2112.2	Octave-Frequency Table	2112.8
Input Amplifier	2112.3	Automatic Switching Device	2112.9
Weighting Network	2112.4	Position of Components	2112.10
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Filter, Level Adj.	2112.6	Circuit Diagram	2112.12

Removal of the Metal Case

After removing the four threaded retainers at the back of the instrument, it is possible to slide the chassis and the front panel out of the case.

Trouble Shooting

If the reason for a fault is not an obvious one such as a dead tube, broken down resistor, blown or disconnected fuse etc., then first test the voltages of all the tubes and compare them with the voltage shown in the circuit diagram in order to localize the defect. Should this method of finding the fault prove unsuccessful, then check the instrument by adopting the method described in the adjustment procedure. When the trouble has been found and remedied, the voltages and adjustments which are influenced by the remedy must be rechecked.

To correct a fault in a filter the filter drawer in question must be taken out. This can be done after the leads to the drawer have been unsoldered and the two screws which hold the drawer in place removed. The drawer will be rather tight at beginning, as the other end is held firmly by a pair of springs.

The tolerances stated in the instructions can only be used as a guide for adjustment and control, but any deviations must not be corrected without being sure that tolerances of the instruments used for making the adjustment are so small as to have no influence on the measurements.

The instructions in this Manual are given purely as a guide to the service of equipment. Some faults, as f.inst. small deviations in tolerances require for their correction special control equipment and extensive experience, and in these cases it is necessary to send the instrument to the factory.

Spare Parts

Please state type and serial number of apparatus when spare parts are ordered.

Instruments and accessories necessary for service and repair:

Multimeter (50 μA)
Frequency Analyzer type 2107
Beat Frequency Oscillator type 1022
(Beat Frequency Oscillator type 1013)
Pistonphone type 4220
Cathode Follower type 2612/2613
Condenser Microphone type 4131/32
(Frequency counter)
Pressure gauge (30-50 gr)

Meter Circuit

valid from serial no. 185131

1.1. Mechanical Zero-Point

METER SWITCH:"Off"
POWER:"Off"

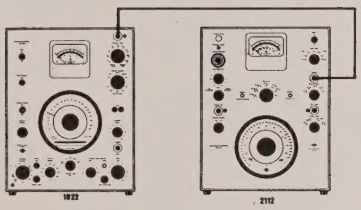
Adjust for zero deflection.

1.2. Electrical Zero-Point

METER RANGE:"10 V"
RANGE MULT.:"X 1"
POWER:"On"

Check that the instrument is still at zero deflection.

Tolerance:" 1/2 pointer width"



1.3. Check of Meter Switch

a. METER SWITCH:"RMS, fast"
POWER:"Off"

Frequency: 1ooo Hz. Adjust the input voltage for a 16 dB deflection on type 2112.

b. METER SWITCH to "Average, fast"

Deflection on type 2112: 14.9 - 15.3 dB
If necessary adjust P 6.

c. METER SWITCH to "Peak, fast"

Deflection on type 2112: 18.5 - 19.5 dB
If necessary adjust P 6 and repeat item b.

Also check a-b-c at 20 Hz in pos. "slow"
20ooo Hz in pos. "fast"

1.4. Sensitivity

METER SWITCH:"RMS, fast"
POWER:"Off"

Frequency: 1ooo Hz. Adjust the input voltage for a full scale deflection on type 2112. The input voltage from type 1022 should be within 8 - 11 V.

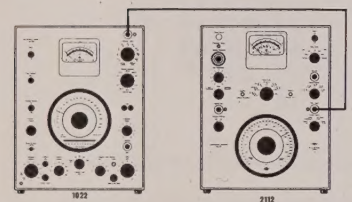
Possible reason for fault: defective diodes Q 9 - 12.

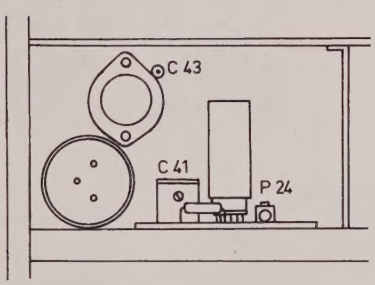
If the cold cathode tube V 14 is dark it should be changed.

Output Amplifier

2112.2

valid from serial no. 227997





2.1. Sensitivity

INPUT SWITCH:"Direct"
FUNC.SELECTOR:"Ext.filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS, fast"

POWER ON

Input signal: 1 V. 1ooo Hz.

Deflection on type 2112: approx. 10 V.

If not check item 3.1.

2.2. Range Multiplier

INPUT SWITCH:"Direct"
FUNC.SELECTOR:"Ext.filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS, fast"

Frequency: 1ooo Hz. Adjust the input voltage for an 18 dB deflection on type 2112.

Check the steps of RANGE MULT. by comparison to type 1022.

Tolerance: $\pm$ o.1 dB (+ tolerance of type 1022: o.2 dB)

Possible reasons for fault: defective tube V 4
defective resistor R 47-51

2.3. Frequency Response

a. INPUT SWITCH:"Direct"
FUNC.SELECTOR:"Ext.filter"
RANGE MULT.:"X o.3"
METER SWITCH:"RMS, fast"

The apparatus must be placed in its case or in other way effectively screened.

If the instrument is used at frequencies above 20ooo Hz trimmer C 41 and C 43 should be adjusted at 40ooo Hz which require use of a high frequency oscillator f.inst. type 1013.

Frequency: 1ooo Hz. Adjust the input voltage for an 18 dB deflection on type 2112.

Change frequency to 20ooo Hz.
Deflection on type 2112: 18 dB.
Tolerance: $\pm$ o.2 dB (+ tolerance of type 1022: o.3 dB)
If necessary adjust C 41.

b. RANGE MULT. to "X o.1"

as item a, but adjust C 43.

c. Check all steps of RANGE MULT.

Vary the frequency from 20 - 20ooo Hz and check the deflection on type 2112.

Tolerance: $\pm$ o.2 dB (+ tolerance of type 1022: o.3 dB)

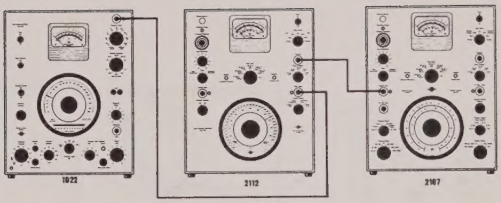
Possible reasons for fault: defective tubes V 4 - V 5 - V 16.

2.4. Output Impedance

INPUT SWITCH:"Direct"
FUNC.SELECTOR:"Ext.filter"
RANGE MULT.:"X 1"
METER SWITCH:"Peak, fast"

Frequency: 1ooo Hz. Adjust the input voltage for a 20 dB deflection on type 2112.

When loading the RECORDER socket with a resistor of 1200 Ω the deflection should be within 19.5 - 20 dB.



2.6. Output Voltage

a. INPUT SWITCH:"Direct"
FUNC.SELECTOR:"Ext.filter"
RANGE MULT.:"X o.3"
METER SWITCH:"RMS"

Frequency: 1ooo Hz. Adjust the input voltage for a 20 dB deflection on type 2112.

Output voltage on the RECORDER socket: 8 - 11 V.

b. METER SWITCH to "Off"

If the input voltage is increased by 10 dB the output voltage should increase by 9.7 - 10.3 dB.

2.7. Noise - Hum

a. INPUT SWITCH:"Direct"
FUNC.SELECTOR:"Ext.filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"

The apparatus must be placed in its case or in other way effectively screened.

Disconnect type 1022 and measure hum at line frequency and 2nd and 3rd harmonic.

Tolerance: max. 5 mV hum
max. 10 mV noise

b. RANGE MULT. to "X o.01"

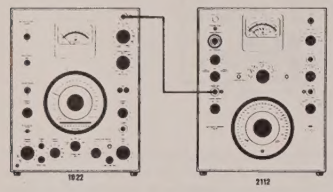
Tolerance: max. 10 mV hum
max. 20 mV noise

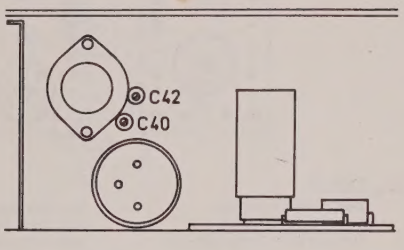
Possible reasons for fault: defective tube V 4
defective transistor V 13
defective diodes Q 1-2

Input Amplifier

2112.3

valid from serial no. 77548





3.1. Sensitivity-Reference

a. INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"Lin. 2-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS, fast"

Frequency: 1ooo c/s. Adjust the input voltage to exactly 8 V.

Adjust P 3 SEN.AMPL.INPUT for 8 V deflection on type 2112.

b. METER RANGE to "Ref."

Adjust P 1 for deflection to the red line on type 2112.

c. INPUT SWITCH to "Cond.micr."

Adjust P 2 SEN.COND.MICR. for deflection to the red line on type 2112.

3.2. Meter Range

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"Lin. 2-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS, fast"

Frequency: 1ooo Hz. Adjust the input voltage for an 18 dB deflection on type 2112.

Check the steps of METER RANGE by comparison to type 1022.

Tolerance: $\pm$ o.15 dB (+ tolerance of type 1022: o.2 dB)

Possible reasons for fault: defective tube V 1
defective resistors R 41 - 46.

3.3. Frequency Response

a. INPUT SWITCH:"Direct"
METER RANGE:"100 mV"
FUNC.SELECTOR:"Lin.2-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS, fast"

The apparatus must be placed in its case or in other way effectively screened If the instrument is used at frequencies above 20ooo Hz trimmer C 40 and C 42 should be adjusted at 40ooo Hz which requires use of a high frequency oscillator, f.inst. type 1013.

Frequency: 1ooo c/s. Adjust the input voltage for an 18 dB deflection on type 2112.

Change frequency to 20ooo Hz and adjust C 42 for an 18 dB deflection on type 2112.

b. METER RANGE to "10 V"

As under item a but adjust C 40 for an 18 dB deflection on type 2112.

c. Check all steps of METER RANGE

Vary the frequency from 20-20ooo Hz and check the deflection on type 2112.

Tolerance: $\pm$ o.3 dB (+ tolerance of type 1022: o.3 dB)

Possible reason for fault: defective tubes V 1-2.

3.4. Overload Indicator

INPUT SWITCH:"Direct"
METER RANGE:"1 V"

Input signal: 1 V. 1ooo Hz.

The indicator should light up if the input voltage increases by 9-11 dB.
Also check at frequencies from 20 - 20ooo Hz.

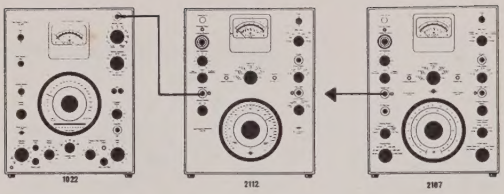
3.5. Output Impedance

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:~~"Lin.2-40ooo"~~ 1/3 OCT
RANGE MULT.:"X o.1"
METER SWITCH:"RMS, fast"
FILTER IN LIN

Load the EXT.FILTER INPUT socket with a resistor of 500 Ω in series with a 50 µF capacitor.

Set frequency to 1ooo Hz and adjust the input voltage for a 20 dB deflection on type 2112.

When changing the resistor to 50 Ω the deflection on type 2112 should be within 18.5 - 20 dB.



3.6. Distortion

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"Ext.filter"

Distortion down to around o.5% can be measured by type 1022 and type 2107. only. Lower distortion requires the use of a filter type 1607 connected between type 2112 and type 2107 for rejection of fundamental frequency and a filter connected between type 1022 and type 2112 to ensure that the distortion of the input signal is below o.01%.

If the filters are available check limits.

Adjust the input voltage for 1 V on EXT. FILTER INPUT socket which is loaded with a resistor of 500 Ω in series with a 50 µF capacitor.

Measure distortion at 40 - 1ooo - 6500 Hz.

Tolerance:	max. o.1%	2nd harmonic
	max. o.1%	3rd harmonic

3.7. Noise - Hum

a. INPUT SWITCH:"Potentiometer"
METER RANGE:"10 mV"
FUNC.SELECTOR:"Ext.filter"
INPUT POTENTIOMETER:"10"

The apparatus must be placed in its case or in other way effectively screened.

Disconnect type 1022 and measure hum at line frequency and 2nd and 3rd harmonic.

Tolerance:	max. 200 µV hum	
	max. 1.5 mV noise	

b. INPUT POTENTIOMETER:"0"

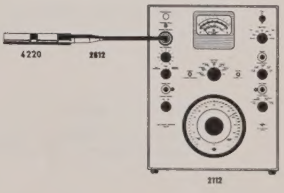
Tolerance:	max. 200 µV hum	
	max. 500 µV noise	

Possible reasons for fault:
defective tube V 1
defective resistor R 31
defective transistor V 13
defective diodes Q 14 - 15

3.8. Polarization Voltage

Connect a multimeter to POL.VOLTAGE socket and check the d.c. voltage: 200 V.

If necessary adjust P 4.



3.9. Acoustical Calibration

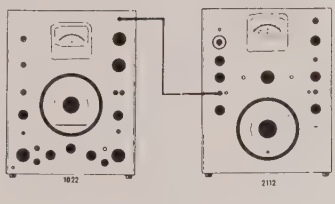
INPUT SWITCH:"Cond.Micr."
METER RANGE:"120 dB SL"
FUNC.SELECTOR:"Lin. 2-40ooo"
RANGE MULT.:"-10 dB"
METER SWITCH:"RMS, fast"

Switch on the pistonphone and adjust P2 SEN.COND.MICR. until the deflection on type 2112 is equal to the SPL produced by the pistonphone, with, for example, a pistonphone producing 124.1 dB the deflection should be 14.1 dB.

Weighting Network

2112.4

valid from serial no. 64187



4.1. Linear

a. INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"Lin.2-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS,fast"

Frequency: 1ooo Hz. Adjust the input voltage for an 18 dB deflection on type 2112.

Vary the frequency from 20 - 20ooo Hz.
Deflection on type 2112: 18 dB.

Tolerance: ± o.3 dB (+ tolerance of type 1022: o.3 dB)

b. METER RANGE to "Ref."

Adjust P 3 SEN.AMPL.INPUT for a deflection to the red line on type 2112.

c. FUNC.SELECTOR to "1/3 Octave"
FILTER SWITCH to "Lin."

Adjust R 99 for a deflection to the red line on type 2112. (LIN 1/3)

Tolerance: ± o.05 dB.

4.2. Curve A-B-C

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"1/3 Octave"
RANGE MULT.:"X 1"
METER SWITCH:"RMS,fast"

Frequency: 1ooo Hz. Adjust the input voltage for an 18 dB deflect on on type 2112.

b. FILTER SWITCH to "A"

Adjust R 98 for an 18 dB deflection on type 2112.

c. FILTER SWITCH to "B"

Adjust R 97 for an 18 dB deflection on type 2112.

d. FILTER SWITCH to "C"

Adjust R 94 for an 18 dB deflection on type 2112.

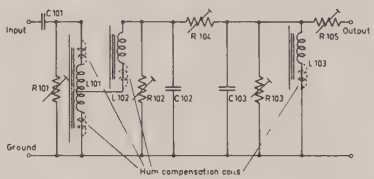
e.

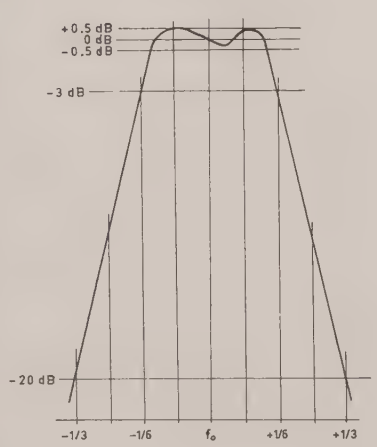
Freq.	Curve "A" Defl. on type 2603	Range Mult.	Curve "B" Defl. on type 2603	Range Mult.	Curve "C" Defl. on type 2603	Range Mult.
Hz	dB		dB		dB	
20	4.6-12.6	X o.01	10.6-18.6	X o.1	8.7-16.7	X 1
63	10.4-13.9	X o.1	7.1-10.6	X 1	15.7-19.2	X 1
500	14.4-15.2	X 1	17.3-18.1	X 1	17.6-18.4	X 1
1000	17.7-18.3	X 1	17.7-18.3	X 1	17.7-18.3	X 1
2000	19.0-19.4	X 1	17.6-18.0	X 1	17.6-18.0	X 1
8000	14.9-17.4	X 1	13.0-15.5	X 1	13.0-15.5	X 1
20ooo	6.8-10.3	X 1	15.0-18.5	X o.3	14.9-18.4	X o.3

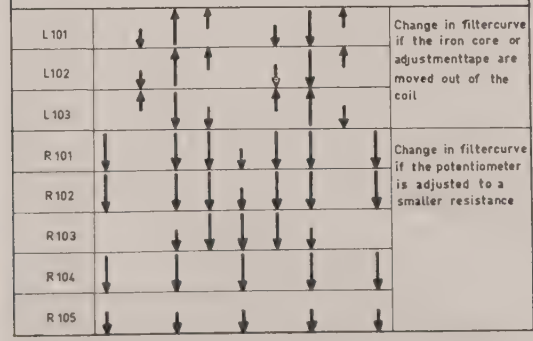
Filter Curves

valid from serial no. 64187

1/3 Octave Filter







Change in filtercurve if the iron core or adjustmenttape are moved out of the coil

Change in filtercurve if the potentiometer is adjusted to a smaller resistance

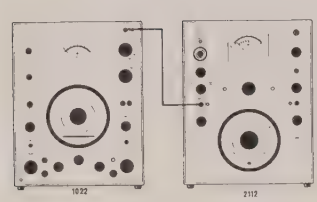
Typical filtercurves for faulty filters

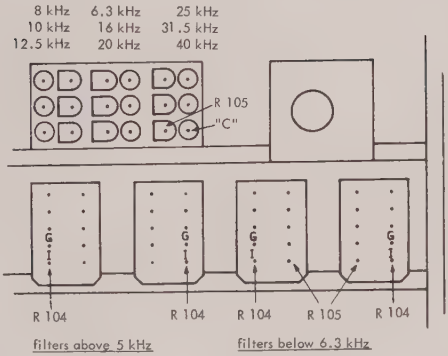
Correct filtercurve 0 dB

Faulty component	Adjustment procedure	Filtercurve for faulty filter
R 104.105	2112.6	+10 dB, 0 dB, -4 dB
R 101.102.103	2112.7	+4 dB, 0 dB
C 101. L 101	2112.7	0 dB, -5 dB
C 103. L 103	2112.7	0 dB, -15 dB
L 101.102.103 trimmer 'C'	2112.7	+2 dB, 0 dB

Filter, Level Adj.

valid from serial no. 64187





6.1. 1/3 Octave Filter

a. INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"1/3 Octave"
RANGE MULT.:"X 1"
METER SWITCH:"RMS, fast"
FILTER SWITCH:"Lin."

b. FILTER SWITCH in required position 25-5000 Hz

Set the frequency to the center frequency of the filter and adjust the input voltage for an 18 dB deflection on type 2112.

Vary the frequency around the center frequency of the filter and check the filter curve.

Deflection on type 2112: 18.0-18.5 dB for the tops
17.5-18.0 dB for the valleys

If necessary adjust R 104 or R 105

Change frequency to + and - 1/6 octave.
Deflection on type 2112: approx. 15 dB.
After adjustment of R 104-105, check 6.2.

c. FILTER SWITCH in required position 6300-16000 c/s

As under item b but adjust the valleys by means of R 104 or R 105 and the tops by means of trimmer "C".

d. FILTER SWITCH in required position 20000-40000 Hz

Check of these filters requires use of a high frequency oscillator f.inst. type 1013.

Check and tolerances as under item c.

6.2. 1/1 Octave Filter

a. INPUT SWITCH:"Direct"
METER RANGE:"10 V"
FUNC.SELECTOR:"Octave"
RANGE MULT.:"X 0.3"
METER SWITCH:"RMS, fast"
FILTER SWITCH:"Lin."

b FILTER SWITCH in required position 31.5-63 Hz

Set frequency to the center frequency of the filter and adjust the input voltage for an 18 dB deflection on type 2112.

Vary the frequency around the center frequency of the filter.

Deflection on type 2112: 18 - 20 dB for the tops
16 - 18 dB for the valleys

Change frequency to + and - 1/2 octave.
Deflection on type 2112 approx.: 15 dB.

If necessary to adjust the filter. Set the frequency at the point where the deflection exceeds the tolerance and note the deviation from 18 dB deflection on type 2112.

Change FUNC. SELECTOR to " 1/3 Octave" and turn the FILTER SWITCH to the defect 1/3 octave filter, indicated by the greatest deflection on type 2112 (RANGE MULT.:"X 1)

Change frequency to the center frequency of the defect filter and adjust the deflection on type 2112 by means of R 104 to the deviation just noted from 18 dB deflection, but in opposite direction.

Then adjust R 105 for a deflection on type 2112: 17.5–18.0 dB and repeat item b.

c. FILTER SWITCH in required position 125–8000 Hz

Adjustment as under item b,
but deflection on type 2112: 18 – 19 dB for the tops
17 – 18 dB for the valleys

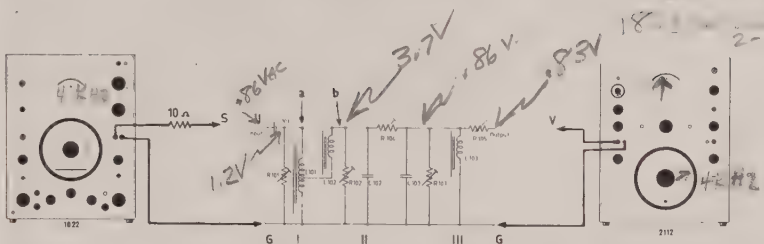
d. FILTER SWITCH in required position 16000–31000 Hz

Adjustment of these filters requires use of a high frequency oscillator f.inst. type 1013.

Adjustment and tolerances as under item c.

Filter, compl. Adj.

valid from serial no. 64187



MODULATION:"Off"
COMPRESSOR:"Off"
MATCHING IMP.:"6 Ω"

INPUT SWITCH:"Direct"
FUNC. SELECTOR:"Lin. 2-40ooo"
METER SWITCH:"RMS, fast"

Before adjustment turn potentiometer R 101-2-3 to mid.position R 104 to max. resistance and R 105 to min.resistance.

7.1. Adjustment of Resonant Circuit I and II

a. Reference adj.

Connect: S and V to point 1
b to point G

Set the frequency to the center frequency of the filter and adjust the input voltage for an 18 dB deflection on type 21.. (RANGE MULT.:"X 1" and METER RANGE:"1 V")

b. Adj. of resonant frequency L101

Change V to point a.

Change frequency to approx. 1% above the center frequency of the filter and adjust L101 to max. deflection on type 2112.

c. Adj. of Q. R101

Adjust R 101, if any (some of the low frequency filters have no R 101), for a 19 dB deflection on type 2112 (RANGE MULT.:"X 1" and METER RANGE: "10 V")

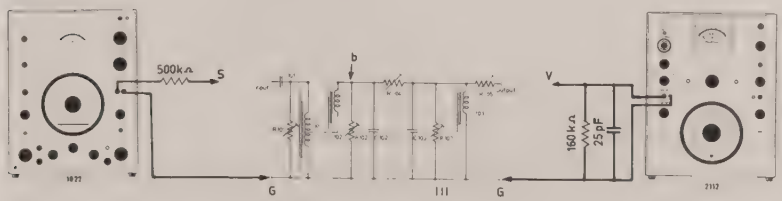
d. Adj. of resonant frequency L102

Connect: S to point a
V to point b
Filter output to point G.

Adjust L 102 to max. deflection on type 2112 at the same frequency as under item b.

e. Adj. of Q. R102

Adjust R 102, if any (some of the low frequency filters have no R 102), for a 10 dB deflection on type 2112 (RANGE MULT.:"X o.3 and METER RANGE: "10 V".



7.2. Adjustment of Resonant Circuit III

a. Reference adj.

Connect S to V

Set the frequency to the center frequency of the filter and adjust the input voltage for an 18 dB deflection on type 2112 (RANGE MULT.:"X 1" and METER RANGE:"1 V").

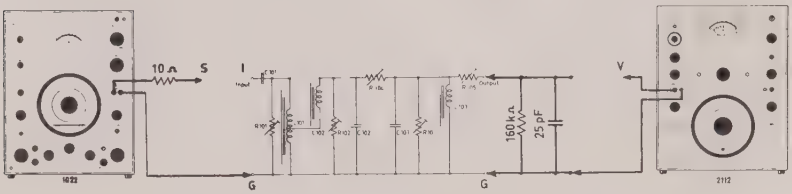
b. Adj. of resonant frequency L103

Connect S and V to filter output
b to point G

Set the frequency to approx. 1% below the center frequency of the filter and Adjust L103 to max. deflection on type 2112.

c. Adj. of Q. R103

Adjust R 103, if any (some of the low frequency filters have no R 103), for a 10 dB deflection on type 2112 (RANGE MULT.:"X o.3" and METER RANGE: "1 V")



Adjustment of attenuation at ± 1/6 and ± 1/3 octave requires use of a frequency counter connected to type 1022 as the accuracy of the frequency should be within o.1-o.2%.

7.3. Adjustment of Filter Curve

a. Reference adj.

Connect: S and V to point 1

Set frequency to the center frequency of the filter and adjust the input voltage for an 18 dB deflection on type 2112 (RANGE MULT.:"X 1" and METER RANGE:"1 V")

b. Filter tops and valleys

Change V to filter output.

Vary the frequency around the center frequency of the filter.
Average deflection on type 2112: 18 dB.
If necessary adjust R 104.

Check that the 2 tops have the same height.
If necessary adjust L103.

Check the deflection on type 2112: 18.0-18.5 dB for the tops
17.5-18.0 dB for the valleys

If necessary adjust R103 (or R 101-2)

Attenuation at ± 1/3 octave

Check that the attenuation at ± 1/3 octave is equal.

Attenuation: Filters below 1ooo c/s approx. 18 dB
Filters above " " 20 dB

If necessary adjust L101-2-3 in the same direction.

d. Attenuation at ± 1/6 octave

Check that the attenuation at ± 1/6 octave is equal.
Attenuation: approx. 3 dB.
If necessary adjust L101-2-3 in the same direction.

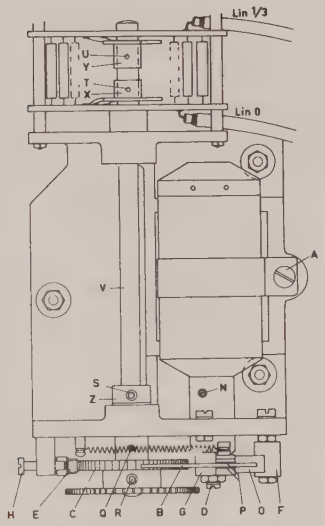
After adjustment mount the filter drawer in type 2112 and check the filter according to 2112.6.

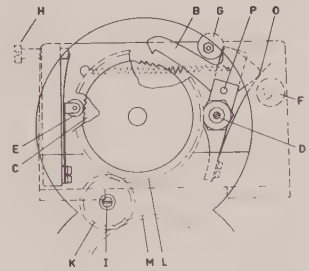
Octave - Frequency Table

- octave			center frequency	+ octave		
1/2	1/3	1/6	c/s	1/6	1/3	1/2
	10.00	11.22	12.5	14.13	15.85	
11.22	12.59	14.13	16	17.78	19.95	22.40
	15.85	17.78	20	22.40	25.10	
	19.95	22.40	25	28.20	31.60	
22.40	25.10	28.20	31.5	35.50	39.80	44.70
	31.60	35.50	40	44.70	50.10	
	39.80	44.70	50	56.20	63.10	
44.70	50.10	56.20	63	70.80	79.40	89.10
	63.10	70.80	80	89.10	100.0	
	79.40	89.10	100	112.2	125.9	
89.10	100.0	112.2	125	141.3	158.5	177.8
	125.9	141.3	160	177.8	199.5	
	158.5	177.8	200	224.0	251.0	
177.0	199.5	224.0	250	282.0	316.0	355.0
	251.0	282.0	315	355.0	398.0	
	316.0	355.0	400	447.0	501.0	
355.0	398.0	447.0	500	562.0	631.0	708.0
	501.0	562.0	630	708.0	794.0	
	631.0	708.0	800	891.0	1000	
708.0	794.0	891.0	1000	1122	1259	1413
	1000	1122	1250	1413	1585	
	1259	1413	1600	1778	1995	
1413	1585	1778	2000	2240	2510	2820
	1995	2240	2500	2820	3160	
	2510	2820	3150	3550	3980	
2820	3160	3550	4000	4470	5010	5620
	3980	4470	5000	5620	6310	
	5010	5620	6300	7080	7940	
5620	6310	7080	8000	8910	10000	11220
	7940	8910	10000	11220	12590	
	10000	11220	12500	14130	15850	
11220	12590	14130	16000	17780	19950	22400
	15850	17780	20000	22400	25100	
	19950	22400	25000	28200	31600	
22400	25100	28200	31500	35500	39800	44700
	31600	35500	40000	44700	50100	

Automatic Switching Device

valid from serial no. 64187





9.1. Mechanical Adjustment

a. Max. operating power

Operate the FILTER SWITCH automatically, by means of pulses from a Level Recorder Type 2305 or an external DC supply (24 V, 180 mA) in series with a switch, connected to REMOTE CONTROL jack. (+ should be connected to pin 2 and – to pin 1).

Loosen screw A and rotate the motor until max. operating power is obtained.

Before retightening screw A check that the pawl B is located in the middle of the pawl wheel C.

b. Pawl mechanism

Turn the motor axle D clockwise to its limit. Check that the spring loaded locking roll E is in a position between 2 teeth on the pawl wheel C. If not loosen the nut and turn the eccentric nylon bush F to the correct position. After adjustment carefully retighten the nut.

Turn the motor axle D slowly clockwise and check the movement of the pawl B. The pawl should first move down to the pawl wheel C on a point between 2 teeth and then turn the pawl wheel one position. If not, loosen the nut and turn the eccentric nylon bush G to the correct position.
After adjustment carefully retighten the nut.

Replace the frequency pointer and the bakelite knob.

Adjust the spring load on locking roll E by means of screw H. The movement of the FILTER SWITCH should be smooth but the screw should be tightened so that the pressure can overcome the friction in the switch and move the pawl wheel back again if it is left a little out of locking position.

Operate the FILTER SWITCH automatically as under item a and check that the switching is stable, if not readjust screw H.

c. Play in the frequency pointer.

Loosen screw I and tighten it again in a position where the play between the nylon wheel K and both the metal wheels L and M is small, but without any point where the wheels are moved with force.

d. Lubricating

Apply a little thin non-acidic machine oil (e.g. sewing machine oil) only to the following parts: Motor, point N

Switching axle, point Q

Pawl mechanism, point O, P

9.2. 50 Position Switch

Remove the protecting tape from the left side of the switch.

a. Cleaning

Loosen screws R-S-T-U and pull out axle V far enough so that the rotary contacts X-Y are free.

Carefully clean the fixed and rotary contacts with a soft cloth and trichlorethylene.

b. Contact Pressure

After cleaning replace the rotary contacts X-Y and axle V, tighten the pawl wheel C and stop-bush Z in a position which allows only a slight play in the axial direction.

Adjust the rotary contacts X-Y along the axle for a contact pressure of 30-40 gr. and tighten screws T-U.

c. Check of Switch

Connect an ohmmeter across the core in the coax cable "Lin.1/3" and the green lead connected to soldering tag "Lin. 1/3" on filter drawer ZS 0150 and turn the FILTER SWITCH to a position where the resistance is 0.

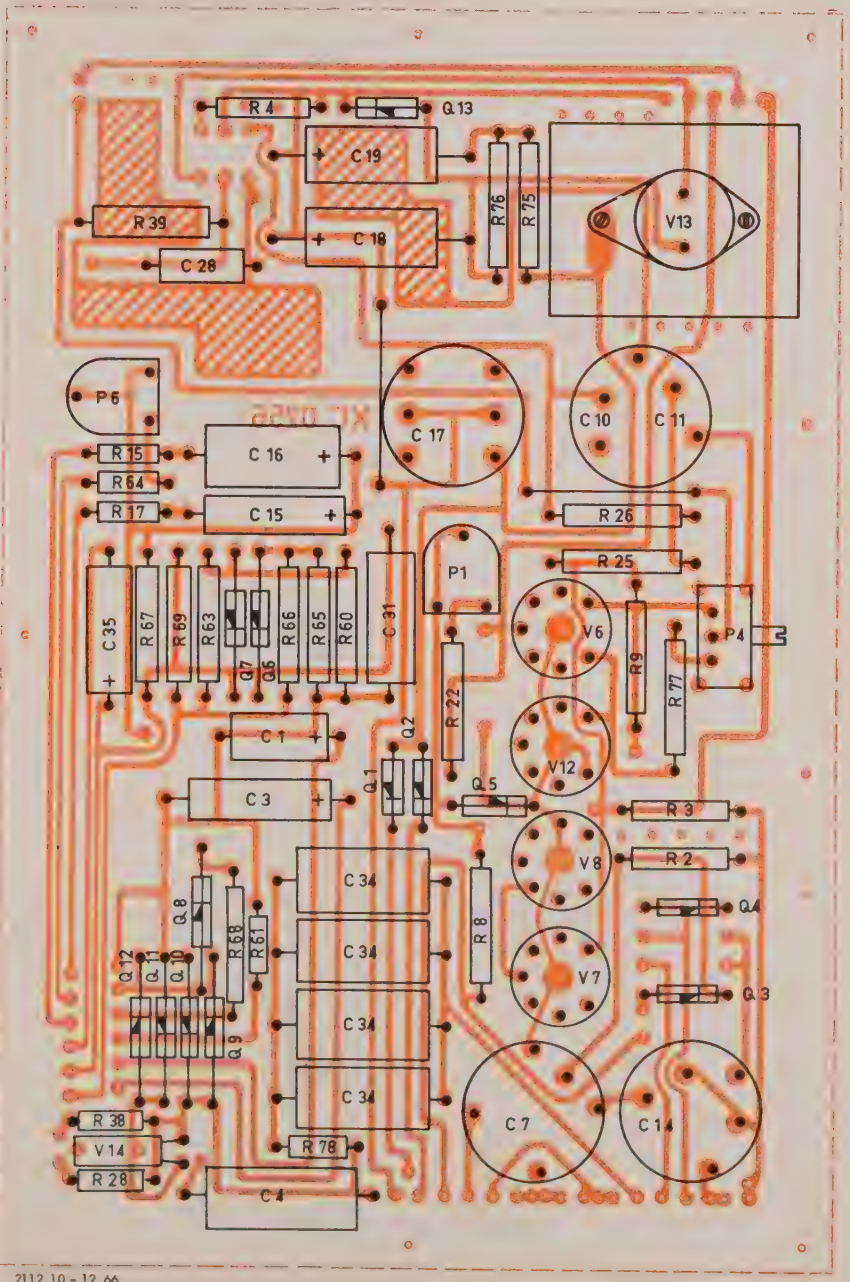
Replace the frequency scale and fix the pointer in position "Lin."

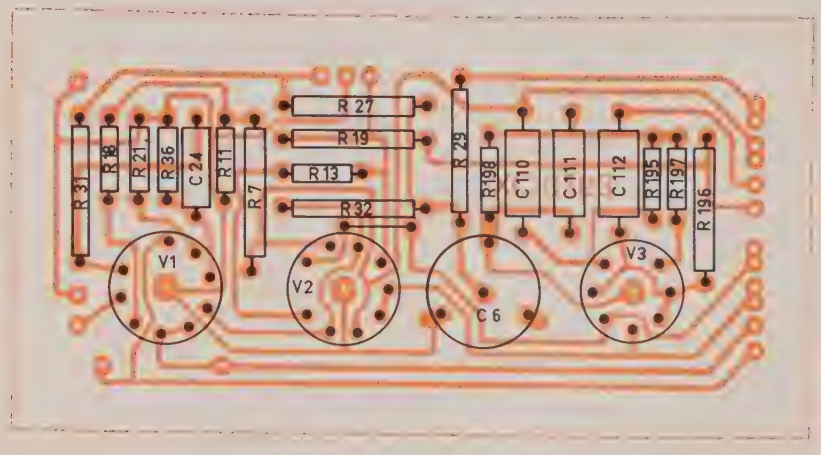
Check that the rotary contact Y is placed on the axle V in relation to the pawl wheel so that it gives contact symmetrically around the locking position. If not loosen screw U and correct the position of the rotary contact.

After adjustment recheck contact pressure.

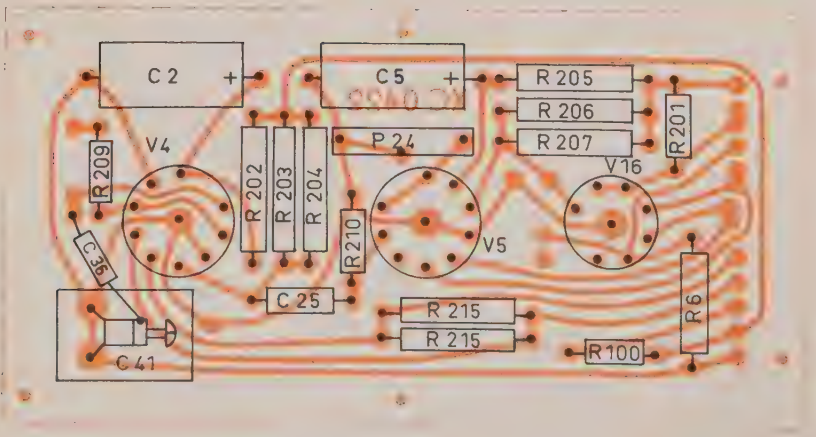
Connect the ohmmeter across the core in the coax cable "Lin.0" and the red lead connected to soldering tag "Lin.0" on filter drawer ZS 0150. Set the FILTER SWITCH to "Lin."

Check the rotary contact X in the same way as rotary contact Y.


R 4
Q 13
C 19
R 39
C 28
C 18
R 76
R 75
V13
P6
C 17
C 10
C 11
R 15
R 64
R 17
C 16
C 15
R 26
R 25
P1
C 35
R 67
R 69
R 63
Q 7
Q 6
R 66
R 65
R 60
C 31
V6
R 9
P4
R 22
R 77
C 1
Q 2
V12
Q 1
C 3
Q 5
R 3
V8
R 2
C 34
R 8
Q 4
Q 8
R 68
R 61
Q 12
Q 11
Q 10
V7
Q 3
Q 9
C 34
C 34
C 34
C 7
C 14
R 38
V 14
R 28
R 78
C 4



Input Amplifier



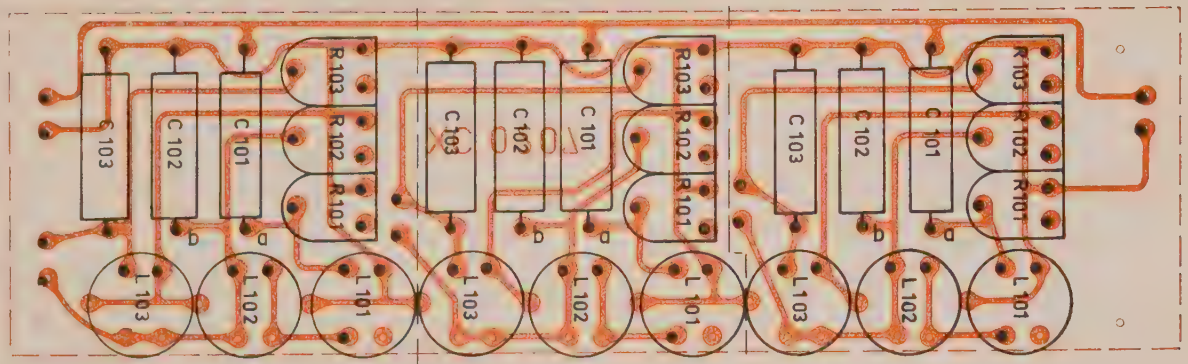
Output Amplifier

Position of Components

valid from serial no. 153650

Filter: 315 c/s
400 c/s
800 c/s
1 kc/s
2 k c/s
4 kc/s — 3,15 k c/s
5 kc/s

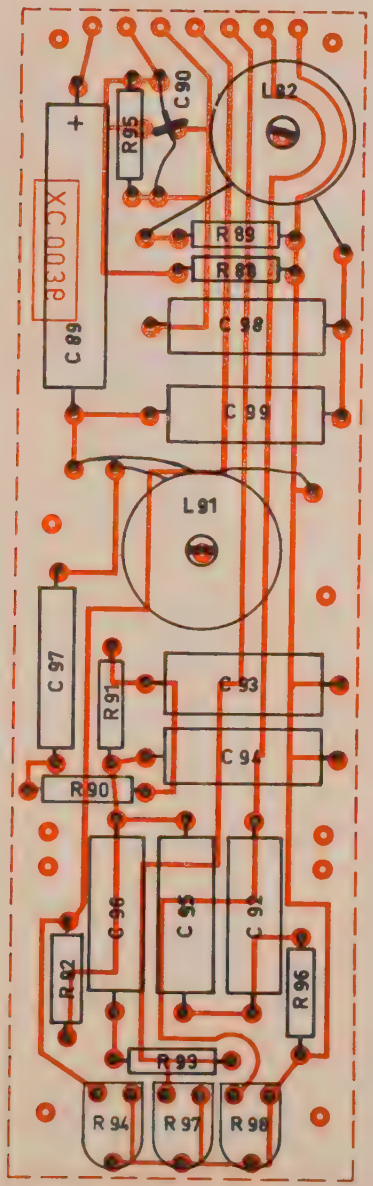
Filter: 250 c/s
500 c/s
630 c/s
1,25 kc/s
1,6 kc/s
2,5 kc/s
3,15 kc/s — 4 k c/s



Filter: 6,3 kc/s
16 kc/s
40 kc/s

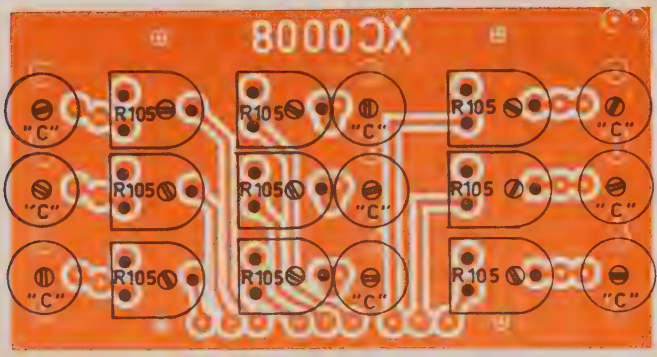
Filter: 8 kc/s
12,5 kc/s
20 kc/s
31,5 kc/s

Filter: 10 kc/s
25 kc/s



Lin 1/1 – 1/3 octave

Weighting Network
curve A-B-C


8000 CX
R105
"C"

BRÜEL & KJÆR
Nærum - Denmark

Parts - List

valid from serial no. 210790

2112.11

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
CAPACITORS:			
C 1	Electrolytic	4 µF/250 V	CE 2034
C 2	"	8 µF/350 V	CE 0802
C 3	"	50 µF/ 50 V	CE 0513
C 4	"	24 µF/ 25 V	CE 0412
C 5	"	8 µF/350 V	CE 0802
C 6	"	16 µF/450 V	CE 6846
C 7	"	50 µF/500 V	CE 0907
C 8,9	"	2 x 100 µF/350 V	CE 0804
C 10,11	"	2 x 100 µF/250 V	CE 0707
C 12,13	"	2 x 100 µF/350 V	CE 0804
C 14	"	100 + 50 µF/350 V	CE 0803
C 15	"	125 µF/ 16 V	CE 0312
C 16	"	640 µF/ 16 V	CE 0209
C 17	"	2 x 1000 µF/ 25 V	CE 0411
C 18,19	"	250 µF/ 25 V	CE 0413
C 21	Ceramic	1 pF/500 V	CK 0100
C 22	Polystyrol	250 pF/500 V	CT 0108
C 23	"	125 pF/125 V	CT 0104
C 24	Polyester	22 nF/400 V	CS 0105
C 25	"	0,1 µF/250 V	CS 0013
C 26	"	56 nF/400 V	CS 0110
C 27	Ceramic	4,7 nF/500 V	CK 3470
C 28	Polyester	0,22 µF/250 V	CS 0017
C 29,30	Paper	0,25 µF/400 V	CP 1722
C 31	Polyester	1 µF/250 V	CS 0025
C 32	Ceramic	1 pF/500 V	CK 0100
C 34	Polyester	2 µF/250 V	CS 0028
C 35	Electrolytic	16 µF/ 63 V	CE 0504
C 36	Ceramic	4,7 pF/400 V	CK 0470
C 40	Trimmer	0,7-3 pF/400 V	CV 0113
C 41	"		CV 0013
C 42,43	"	0,8-6 pF/400 V	CV 0012
C 100	Polyester	68 nF/250 V	CS 0011
C 110-112	"	0,1 µF/250 V	CS 0013
SWITCHES:			
N	Power on-off		NN 0563
O 1	Input		OR 2603
O 2	Meter Range		OV 2110
O 3	Function selector		OR 2111
O 4	Range multiplier		OT 2109
O 5	Meter switch		OS 2112
O 6	Power voltage selector		OA 0021
O 8	Automatic switching		OX 1016
POTENTIOMETERS:			
P 1	Trimmer pot.meter	50 kΩ lin.carbon	PG 3501
P 2,3	" "	100 Ω wire-wound	PQ 1100
P 4	" "	50 kΩ lin.carbon	PG 3501
P 5	Input pot. meter	1 MΩ log.carbon	PP 5100
P 6	Trimmer pot.meter	5 kΩ lin. carbon	PG 2500
P 24	" "	1 kΩ wire-wound	PG 2103
RECTIFIERS:			
Q 1,2	Silicon diode	50 V/0,6 A	QV 0501
Q 3,4	"	1200 V/0.15 A	QV 0025
Q 5	Zener diode	6,8 V/30 mA	QV 1106
Q 6	Germanium diode	OA85	QV 0085
Q 7	"	OA79	QV 0078
Q 8-12	"	OA85	QV 0085
Q 13	Zener diode	13 V/15 mA	QV 1316
Q 16	Silicon diode	50 V/0,6 A	QV 0501
RESISTORS:			
R 2	Wire-wound	5.5 W 330 Ω	RX 0300
R 3	"	" 3.3kΩ	RX 0306
R 4	"	" 30 Ω	RX 0309
R 6	"	8 W 6.8kΩ	RX 0401
R 7	"	5.5 W 6.2kΩ	RX 0303
R 8	Carbon film	1 W 10%	RK 100 kΩ
R 9	"	" "	RK 6.3 kΩ
R 11	"	1/3 W 5%	RK 56 Ω
R 12	"	1/2 W 10%	RK 200 Ω
R 13	"	1/3 W "	RK 50 Ω

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
RESISTORS:			
R 14	Carbon film	1/3 W 10%	RK 800 kΩ
R 15	"	" "	RK 160 Ω
R 17	"	" 2%	RK 200 Ω
R 18	"	" 10%	RK 1 kΩ
R 19	"	1/2 W "	RK 1,25 kΩ
R 21	"	1/3 W 5%	RK 2,5 kΩ
R 22	"	1/2 W "	RK 86 kΩ
R 25,26	"	" 10%	RK 31,5 kΩ
R 27	"	" "	RK 50 kΩ
R 28	"	1/3 W 5%	RK 25 kΩ
R 29	"	1/2 W 10%	RK 100 kΩ
R 31	"	" "	RK 315 kΩ
R 32	"	" 5%	RK 315 kΩ
R 36	"	1/3 W 10%	RK 3,15 MΩ
R 38	"	" 5%	RK 125 kΩ
R 39	"	1/2 W 10%	RK 25 MΩ
R 61	"	1/3 W "	RK 7 kΩ
R 64	"	" "	RK 6,3 kΩ
R 75,76	"	1/2 W "	RK 100 Ω
R 77	"	" "	RK 100 kΩ
R 78	"	1/3 W "	RK 50 Ω
R 106	"	1/4 W 170 kΩ	RA 0100
R 107	"	" 5%	RK 250 Ω
R 108	"	1/2 W 10%	RK 10 MΩ
R 110,111,113	"	1/4 W 160 kΩ	RA 0101
R 114-116	"	1/3 W 2%	RK 75.9 kΩ
R 117-120	"	" 2%	RK 425 kΩ
R 122	"	" 10%	RK 2 kΩ
R 195	"	1/3 W "	RK 5 MΩ
R 196	"	1/2 W "	RK 50 kΩ
R 197	"	1/3 W 5%	RK 800 Ω
R 198	"	" "	RK 500 Ω
R 200	"	" 10%	RK 31.5 kΩ
R 201	"	" "	RK 5 kΩ
R 202	"	" 5%	RK 1.25 MΩ
R 203,204	"	1/2 W 10%	RK 630 kΩ
R 205-207	"	" "	RK 160 kΩ
R 209	"	1/3 W 5%	RK 2 kΩ
R 210	"	" "	RK 315 kΩ
R 211	"	" "	RK 50 Ω
R 212	"	" "	RK 10 MΩ
PRECISION RESISTORS:			
R 41	Carbon film	1/2 W ±0.5%	RK 22,2 Ω
R 42	"	" "	RK 200 Ω
R 43	"	" "	RK 2 kΩ
R 44	"	" "	RK 20 kΩ
R 45	"	" "	RK 200 kΩ
R 46	"	" "	RK 2 MΩ
R 47	"	" "	RK 14,6 kΩ
R 48	"	" "	RK 31,5 kΩ
R 49	"	" "	RK 100 kΩ
R 50	"	" "	RK 315 kΩ
R 51	"	" "	RK 1 MΩ
R 60	"	" "	RK 2,66 kΩ
R 63	"	" "	RK 8,9 kΩ
R 65	"	" "	RK 17,6 kΩ
R 66	"	" "	RK 19,7 kΩ
R 67	"	" "	RK 23,7 kΩ
R 68	"	" "	RK 34,3 kΩ
R 69	"	" "	RK 49 kΩ
TUBES etc.:			
V 1	Twin triode	ECC83/12AX7	VA 0012
V 2	"	ECC81/12AT7	VA 0009
V 3	Pentode	EF94/6AU6	VA 0021
V 4	"	EF86	VA 0019
V 5	"	EF184/6EJ7	VA 0079
V 6	Stabilizer	OB2	VA 0040
V 7	"	OA2	VA 0037
V 8	"	OB2	VA 0040
V 9	Fuse	1A	VF 0008
V 10	Meter lamp	6,3 V/0,5 A	VS 1271
V 11	Neon lamp	110 V	VS 8001
V 12	Stabilizer	OB2	VA 0040
V 13	Transistor	2N554	VB 0023
V 14	Cold cathode tube	90 V	VA 0072
V 15	Dial lamp	6,3 V/0,3 A	VS 8024
V 16	Pentode	EL95/6DL5	VA 0026

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE
	PRINTED CIRCUIT:	
	Input amplifier	XC 0252
	Power supply	XC 0256
	Output amplifier	XC 0422
	XC 0252 with comp.	8012112
	XC 0256 "	8002112
	XC 0422 "	8022112
	MISCELLANEOUS:	
	Power cord. EUR.	AN 0005
	Power cord. USA	AN 0006
	Rubber foot	DF 7010
I	Moving coil meter	IM 2604
	Coaxial jack	JJ 0115

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REFERENCE
	MISCELLANEOUS:	
	Microphone jack	JJ 0016
	Coaxial plug	JP 0018
	Ground jack	JT 6204
	Insulated jack	JT 8344
	Cabinet Wood	KA 0010
	Cabinet Metal	KQ 0012
	Plastic cover	KF 0028
	Motor for aut. switching	UM 0006
	Frequency dial	SA 0205
	Bakelite-knob, small	SN 0814
	Bakelite-knob, large	SN 0989
	Housing for freq. dial	SO 0188
	Pointer for freq. dial	SV 0015
T	Power transformer	TN 0001
O 7	Aut. switching device (mechanical parts)	OC 0310

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
	COMPONENTS FOR FILTER SECTION ZS 2112:		
	WEIGHTING NETWORK:		
C 89	Electrolytic	40 µF/150 V	CE 2038
C 90	Ceramic	5,6 pF/400 V	CK 0560
C 92,93	Polystyrene	4 nF ±2%/250 V	CT 3225
C 94	"	3,16 nF ±2%/500 V	CT 3233
C 95	"	4 nF ±2%/250 V	CT 3225
C 96	"	6,3 nF ±2%/500 V	CT 3234
C 97	"	63 nF ±2%/125 V	CT 3431
C 98	"	80 nF ±5%/125 V	CT 3432
C 99	Electrolytic reversible	2 µF/100 V	CE 8927
L 91	Auto-transformer		LB 0017
L 92	Coil	50 H	LB 0431
R 88	Carbon film	1/3 W ±2%	RK 75.9 kΩ
R 89	"	" ±5%	RK 400 Ω
R 90,91	"	" ±2%	RK 3.15 kΩ
R 92	"	" "	RK 14 kΩ
R 93	"	" "	RK 32 kΩ
R 94	Trimmer pot.m.	150 kΩ lin.	PG 4151
R 95 96	Carbon film	1/3 W ±2%	RK 160 kΩ
R 97	Trimmer pot.m.	1 MΩ lin.	PG 5102
R 98	"	2MΩ lin.	PG 5202
R 99		1 MΩ lin.	PG 5102
	1/3 OCTAVE FILTERS:		
	FILTER 12.5 c/s:		
C 101-103	Polyester	1 µF ±10%/250 V	CS 0025
R 103,105	Trimmer pot.m.	300 kΩ lin.	PG 4300
R 104	"	250 kΩ lin.	PG 4250
L 101	Coil	80 H	LB 0505
L 102,103	"	80 H	LB 0504
	FILTER 16 c/s:		
C 101-103	Polyester	1 µF ±10%/250 V	CS 0025
C 101-103	"	0.68 µF ±10%/250 V	CS 0023
R 103, 105	Trimmer pot.m.	300 kΩ lin.	PG 4300
R 104	"	250 kΩ lin.	PG 4250
L 101	Coil	63 H	LB 0503
L 102,103	"	63 H	LB 0502
	FILTER 20 c/s:		
C 101-103	Polyester	1 µF ±10%/250 V	CS 0025
C 101-103	"	0,22 µF ±10%/250 V	CS 0017
R 103,105	Trimmer pot.m.	300 kΩ lin.	PG 4300
R 104	"	250 kΩ lin.	PG 4250
L 101	Coil	50 H	LB 0500
L 102,103	"	50 H	LB 0501
	FILTER 25 c/s:		
C 101-103	Polyester	1 µF ±10%/250 V	CS 0025
R 104,105	Trimmer pot.m.	300 kΩ lin.	PG 4301
L 101	Coil	40 H	LB 0105
L 102,103	"	40 H	LB 0104
	FILTER 31.5 c/s:		
C 101-103	Polyester	330 nF ±10%/250 V	CS 0019
C 101-103	"	470 nF ±10%/250 V	CS 0021
R 104,105	Trimmer pot.m.	300 kΩ lin.	PG 4301
L 101	Coil	31.5 H	LB 0107
L 102,103	"	31.5 H	LB 0106
	FILTER 40 c/s:		
C 101-103	Polystyrene	630 nF ±5%/100 V	CT 6107
R 104,105	Trimmer pot.m.	300 kΩ lin.	PG 4301
L 101	Coil	25 H	LB 0409
L 102,103	"	25 H	LB 0408
	FILTER 50 c/s:		
C 101-103	Polystyrene	500 nF ±5%/100 V	CT 6106
R 104,105	Trimmer pot.m.	300 kΩ lin.	PG 4301
L 101	Coil	20 H	LB 0411
L 102,103	"	20 H	LB 0410
	FILTER 63 c/s:		
C 101-103	Polystyrene	400 nF ±5%/100 V	CT 6105
R 104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	16 H	LB 0413
L 102,103	"	16 H	LB 0412
	FILTER 80 c/s:		
C 101-103	Polystyrene	320 nF ±5%/100 V	CT 6104
R 104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	12.5 H	LB 0415
L 102,103	"	12.5 H	LB 0414
	FILTER 100 c/s:		
C 101-103	Polystyrene	250 nF ±5%/100 V	CT 6103
R 103	Trimmer pot.m.	300 kΩ lin.	PG 4300
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	10 H	LB 0117
L 102,103	"	10 H	LB 0116
	FILTER 125 c/s:		
C 101-103	Polystyrene	200 nF ±5%/100 V	CT 6102
R 103	Trimmer pot.m.	300 kΩ lin.	PG 4300
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	8 H	LB 0119
L 102,103	"	8 H	LB 0118
	FILTER 160 c/s:		
C 101-103	Polystyrene	160 nF ±5%/100 V	CT 6101
R 103	Trimmer pot.m.	300 kΩ lin.	PG 4300
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	6.3 H	LB 0121
L 102,103	"	6.3 H	LB 0120
	FILTER 200 c/s:		
C 101-103	Polystyrene	125 nF ±5%/100 V	CT 6100
R 101	Trimmer pot.m.	1 MΩ lin.	PG 5101
R 103	"	300 kΩ lin.	PG 4300
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	5 H	LB 0123
L 102,103	"	5 H	LB 0122

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
FILTER 250 c/s:			
C 101-103	Polystyrene	100 nF ±5%/100 V	CT 3433
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 103,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	4 H	LB 0430
L 102,103	"	4 H	LB 0429
FILTER 315 c/s:			
C 101-103	Polystyrene	80 nF ±5%/125 V	CT 3432
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 103,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	3.16 H	LB 0428
L 102,103	"	3.16 H	LB 0427
FILTER 400 c/s:			
C 101-103	Polystyrene	63 nF ±5%/125 V	CT 3431
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101	Trimmer pot.m.	500 kΩ lin.	PG 4502
R 103,104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	2.5 H	LB 0420
L 102,103	"	2.5 H	LB 0419
FILTER 500 c/s:			
C 101-103	Polystyrene	50 nF ±5%/125 V	CT 3430
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101	Trimmer pot.m.	500 kΩ lin.	PG 4502
R 103,104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	2 H	LB 0422
L 102,103	"	2 H	LB 0421
FILTER 630 c/s:			
C 101-103	Polystyrene	40 nF ±5%/250 V	CT 3239
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101	Trimmer pot.m.	1MΩ lin.	PG 5102
R 103,104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	1.6 H	LB 0424
L 102,103	"	1.6 H	LB 0423
FILTER 800 c/s:			
C 101-103	Polystyrene	31.5 nF ±5%/250 V	CT 3238
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101	Trimmer pot.m.	1MΩ lin.	PG 5102
R 103,104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	1.25 H	LB 0426
L 102,103	"	1.25 H	LB 0425
FILTER 1 kc/s:			
C 101-103	Polystyrene	25 nF ±5%/250 V	CT 3237
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101	Trimmer pot.m.	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
R 104	"	300 kΩ lin.	PG 4301
L 101	Coil	1 H	LB 0441
L 102,103	"	1 H	LB 0440
FILTER 1.25 kc/s:			
C 101-103	Polystyrene	20 nF ±5%/200 V	CT 3230
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	800 mH	LB 0443
L 102,103	"	800 mH	LB 0442

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
FILTER 1.6 c/s:			
C 101-103	Polystyrene	16 nF ±5%/500 V	CT 3236
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	640 mH	LB 0445
L 102,103	"	640 mH	LB 0444
FILTER 2 kc/s:			
C 101-103	Polystyrene	12.5 nF ±5%/500 V	CT 3235
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	500 mH	LB 0447
L 102,103	"	500 mH	LB 0446
FILTER 2.5 kc/s:			
C 101-103	Polystyrene	10 nF ±2%/500 V	CT 3228
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	400 mH	LB 0433
L 102,103	"	400 mH	LB 0432
FILTERS 3.15 kc/s:			
C 101-103	Polystyrene	8 nF ±2%/500 V	CT 3227
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	320 mH	LB 0435
L 102,103	"	320 mH	LB 0434
FILTER 4 kc/s:			
C 101-103	Polystyrene	6.3 nF ±2%/500 V	CT 3234
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	250 mH	LB 0437
L 102,103	"	250 mH	LB 0436
FILTERS 5 kc/s:			
C 101-103	Polystyrene	5 nF ±2%/500 V	CT 3226
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	200 mH	LB 0439
L 102,103	"	200 mH	LB 0438
FILTER 6.3 kc/s:			
C 101-103	Polystyrene	4 nF ±2%/250 V	CT 3225
C 104	Ceramic	68 pF ±5%/400 V	CK 1680
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101,104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103,105	"	150 kΩ lin.	PG 4151
L 101	Coil	160 mH	LB 0527
L 102,103	"	160 mH	LB 0526

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
FILTER 8 kc/s:			
C 101-103	Polystyrene	3.2 nF ±5%/200 V	CT 3233
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103, 105	"	150 kΩ lin.	PG 4151
L 101	Coil	125 mH	LB 0454
L 102, 103	"	125 mH	LB 0453
FILTER 10 kc/s:			
C 101-103	Polystyrene	2.5 nF ±5%/400 V	CT 3223
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103, 105	"	150 kΩ lin.	PG 4151
L 101	Coil	100 mH	LB 0456
L 102, 103	"	100 mH	LB 0455
FILTER 12.5 kc/s:			
C 101-103	Polystyrene	2 nF ±5%/400 V	CT 3222
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103, 105	"	150 kΩ lin.	PG 4151
L 101	Coil	80 mH	LB 0558
L 102, 103	"	80 mH	LB 0557
FILTER 16 kc/s:			
C 101-103	Polystyrene	1.6 nF ±5%/400 V	CT 3232
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 104	Trimmer pot.m.	300 kΩ lin.	PG 4301
R 102	"	500 kΩ lin.	PG 4502
R 103, 105	"	150 kΩ lin.	PG 4151
L 101	Coil	63 mH	LB 0536
L 102	"	63 mH	LB 0534
L 103	"	62 mH	LB 0535
FILTER 20 kc/s:			
C 101-103	Polystyrene	1.25 nF ±5%/400 V	CT 3219
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 103	Trimmer pot.m.	150 kΩ lin.	PG 4151
R 102	"	500 kΩ lin.	PG 4502
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	50 mH	LB 0539
L 102	"	50 mH	LB 0537
L 103	"	49 mH	LB 0538
FILTER 25 kc/s:			
C 101-103	Polystyrene	1 nF ±5%/500 V	CT 0118
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 103	Trimmer pot.m.	150 kΩ lin.	PG 4151
R 102	"	500 kΩ lin.	PG 4502
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	40 mH	LB 0542
L 102	"	40 mH	LB 0540
L 103	"	39 mH	LB 0541

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REFERENCE
FILTER 31,5 kc/s:			
C 101-103	Polystyrene	0.8 nF ±5%/500 V	CT 0116
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 103	Trimmer pot.m.	150 kΩ lin.	PG 4151
R 102	"	500 kΩ lin.	PG 4502
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	31,5 mH	LB 0545
L 102	"	31,5 mH	LB 0543
L 103	"	31 mH	LB 0544
FILTER 40 kc/s:			
C 101-103	Polystyrene	0.63 nF ±5%/400 V	CT 3214
"C"	Trimmer, ceramic	10-40 pF/250 V	CV 0019
R 101, 103	Trimmer pot.m.	150 kΩ lin.	PG 4151
R 102	"	500 kΩ lin.	PG 4502
R 104	"	300 kΩ lin.	PG 4301
R 105	"	150 kΩ lin.	PG 4151
L 101	Coil	25 mH	LB 0548
L 102	"	25 mH	LB 0546
L 103	"	24 mH	LB 0547